

# Memorandum

TO: Florida DOT and Florida Model Task Force Model Advancement Committee

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RE: Standard trip purposes for use in FSUTMS

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This memorandum presents a set of standard trip purposes to be used in FSUTMS models. This list includes **required** trip purposes, which can be expanded to address the needs for particular regions, and **optional** trip purposes that can be used in regions where their inclusion is appropriate. The recommended set of trip purposes is based on a review of all operational FSUTMS models, experience regarding differences in travel behavior for different travel purposes, an examination of the types of data available for model development and validation, and knowledge of the types of analyses for which model outputs are used. The set of trip purposes presented here are intended for use in trip based (i.e., four-step) models.

The trip purposes presented in this memorandum comprise **internal person trips**, made by residents of the model region within the region. Travel demand models must also consider other types of travel within the model region. These are discussed below, along with the ways that they may be considered in models.

- **Truck trips** may include freight carrying trucks, service vehicles, and other commercial vehicles. Truck trips in travel demand models are often segmented by vehicle size, for example light and heavy trucks. In some models, truck and taxi trips are combined into a single trip purpose. All models consider truck trips in some way, but the information on the number and origin-destination patterns of trucks come from other sources than the data used in estimating internal person travel—for example, separate truck or freight models. How trucks should be modeled is beyond the scope of this memorandum.
- **External trips** include trips made by residents that leave the model region, trips made by people living outside the region to and from locations in the region, and “external-external” trips that pass through the region. It is typical for FSUTMS models to generate and distribute “external-internal” or “internal-external” trips (both terms are used similarly in different FSUTMS models but generally refer to any trips with one end inside the model region and one outside). External travel is usually modeled as auto vehicle trips (external truck trips are usually handled in the truck model component) since the level of non-auto (and non-truck) external travel is minimal in most models. “External-internal” (or “internal-external”) is usually listed as a trip purpose in trip generation documentation, but there are currently no instances where these trips are further segmented into purposes such as home based work. It is understood that all models will include external-internal and

(usually) external-external trips, but these trips will not be discussed further in this memorandum.

- **Special generators** refer to locations where the variables available for use in trip production and attraction models (such as employment) are insufficient to accurately estimate the amount of travel demand. They may include locations such as airports, tourist attractions, and recreational facilities. In some models, the number of trips attracted to special generators is estimated directly from other sources such as count data, and the number attractions is added to the trip attractions for the appropriate trip purposes (for example, home based other and non-home based). Some FSUTMS models have a separate trip purpose for airport trips. Since the types of trip attractors that might be considered as special generators varies by model region, there is no standard for special generators statewide, and regions should be free to model these locations in whatever manner they feel is best.
- **Visitor travel** is a large segment of travel in Florida, especially in the areas with the most tourists (though visitor travel may be for other purposes such as business travel). While some FSUTMS models use various means (special generators, airport travel models) to consider at least some portion of visitor travel, the only models that include complete visitor modeling components are a couple of the activity based models. These models use the same visitor model, which was transferred from a location outside Florida and would not be easily implemented in the context of a four-step model. There is therefore no currently recommended standard visitor travel component for FSUTMS. It may make sense for FDOT and the Model Task Force to study how visitor travel can be incorporated into FSUTMS using available or collectable data, perhaps using “big data” sources.

## Review of Operational FSUTMS Models

The documentation for all FSUTMS models was reviewed in terms of the trip purpose definitions. All models separate “home based” trips from “non-home based” trips. Home based trips are those for which either end is at the traveler’s home.

### ***Home based trip purposes***

The following trip purposes are used in all FSUTMS models:

- Home based work (HBW)
- Home based shopping (HBSh)
- Home based social-recreation (HBSR)
- Home based other (HBO) – *see note below*

The following trip purposes are in some but not all FSUTMS models:

- Home based school (HBSc)
- Home based university (HBU) – The Gainesville model separates dormitory based travel as an additional college/university trip purpose

Note that some travel that is not considered in this list may be home based, including trips between home and a special generator, and trips between home and an external location. These trips are generally a small percentage of home based trips, but some models may include them as separate purposes (e.g., airport) or may subtract the estimated trips from the total home based trip productions prior to trip distribution.

The HBO trip purpose includes all home based trips that are not included in any of the other home based purposes. This means that HBO is not defined exactly the same way in all models. For example, college/university trips generated for a model with a separate HBU trip purpose would not be included in the HBO purpose, but those trips would be included in the HBO purpose in a model that has no HBU purpose.

### ***Non-home based trip purposes***

Most FSUTMS models have only a single NHB purpose. A few models separate NHB trips into work based (NHBW) and other (NHBO) trips. NHBW trips are defined as having one end at the traveler's workplace and could be part of a commute to or from home with a stop (or stops), or part of a "work based subtour" where a worker leaves his or her workplace to make one or more stops and then returns to the workplace (for example, to attend a meeting or to have lunch).

## **Recommended Standard Trip Purposes**

Some of the objectives in proposing the standard trip purpose recommendations include the following:

- The models **need to produce the information needed for a variety of types of planning analyses**, and the models need to be sensitive to a number of factors to perform these analyses.
- **Changes from current practice should be as little as possible** and related only to what is necessary to perform the required analyses.
- It is important to recognize that **travel behavior differs by trip purpose**, and differs substantially among some types of trip purposes.
- Trip purpose segmentation **must be supported by the data available** for model development and validation.

With these objectives in mind, the following **standard trip purposes** are proposed:

- Home based work (HBW)
- Home based school (HBSc)
- Home based shopping (HBSh)
- Home based social-recreation (HBSR)
- Home based other (HBO)
- Non-home based work (NHBW)
- Non-home based other (NHBO)

The home based university (HBU) purpose is proposed to be considered an optional trip purpose. Agencies who maintain models should decide whether to include HBU as a separate purpose if there are a substantial number of these trips in their regions. Another optional trip purpose is Airport, which may include non-home based trips, or visitor trips. This purpose can be included in regions where there is a major airport and there is sufficient data with which to model such trips separately. (It should be noted that information on airport trips made by visitors to the region would not be included in the data sources used for estimating trips by other purposes.)

The **HBW**, **HBSH**, and **HBSR** purposes already are included in all FSUTMS models. These purposes each comprise a substantial percentage of travel in a region and have different travel characteristics. Therefore, it makes sense to retain them.

The **HBO** purpose is necessary to account for all home based trips that do not fall under another home based trip purpose, and so it must be included. Its definition depends on the other home based trip purposes in the model; in the case of the recommended set of purposes above, HBO trips would include all trips with one end at home that are not for the purpose of work, school, shopping, or social-recreation (or university, if that trip purpose is included). HBO trips might therefore include trips for such activities as medical, religious, and picking up and dropping off other people.

**HBSc** travel is proposed to be modeled separately in all models because it is much different from other types of travel. It is performed mainly by children who are too young to drive, and many children, especially the youngest, are escorted by an adult to and from school. Non-motorized modes are used much more often for HBSc trips, and school bus is a mode used only for HBSc travel. Time of day patterns for HBSc trips are unique, with most trips to school occurring predominantly in the morning peak period while trips from school occur mostly before the afternoon peak period. Aggregating HBSc trips with other home based trips, therefore, would result in inaccurate model results. HBSc trips accounts for about five to ten percent of all trips, a significant enough percentage to be able to model separately.

It is proposed to separate non-home based travel into **NHBW** and **NHBO**, for the same reasons that home based trips are segmented into separate trip purposes. Non-home based travel made by workers as part of their work activity or work commute has different characteristics (mode, time of day, etc.) than other non-home based travel, just as home based work trips are different in nature than other home based trips. Non-home based travel constitutes about 20 to 35 percent of all trips, and NHBW travel is about 25 to 40 percent of the non-home based travel. This indicates that NHBW is a significant enough proportion of travel to be able to model separately.